Complete Summary

GUIDELINE TITLE

Guidelines for prehospital management of traumatic brain injury.

BIBLIOGRAPHIC SOURCE(S)

Brain Trauma Foundation. Guidelines for prehospital management of traumatic brain injury. New York (NY): Brain Trauma Foundation; 2000. 81 p. [165 references]

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Traumatic brain injury

GUIDELINE CATEGORY

Evaluation
Management
Risk Assessment
Treatment

CLINICAL SPECIALTY

Emergency Medicine

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Emergency Medical Technicians/Paramedics

Nurses
Physician Assistants
Physicians
Public Health Departments
Respiratory Care Practitioners

GUIDELINE OBJECTIVE(S)

- To improve future patient outcome by providing accurate, evidence-based, scientific guidelines that are also realistic and user-friendly for pre-hospital assessment and treatment of brain injured patients
- To assist first responders in early recognition of initial signs and symptoms of traumatic brain injury
- To assist first responders in identifying interventions aimed at minimizing secondary injury of traumatic brain injury patients
- To assist first responders in selecting appropriate hospital destinations for head injured patients, including the highest-level trauma center for those with severe traumatic brain injury

TARGET POPULATION

Adult and pediatric pre-hospital patients with severe traumatic brain injury (Glasgow Coma Scale scores of 3 to 8)

INTERVENTIONS AND PRACTICES CONSIDERED

Assessment Practices

1. Blood pressure measurement
2. Oxygen saturation measurement, using pulse oximetry
3. Glasgow Coma Scale (GCS) score measurement
4. Eye examination for pupillary asymmetry, fixation, and dilation

Treatment Practices: Airway, Ventilation, and Oxygenation

1. Administration of supplemental oxygen
2. Airway securement with endotracheal intubation, if available

Treatment Practices: Fluid Resuscitation

Fluid resuscitation with isotonic crystalloid solution using hypertonic saline with or without dextran, has been used with some encouraging results.

Treatment Practices: Brain-Targeted Therapy

1. Hyperventilation in patients with suspected, impending cerebral herniation
2. Sedation, analgesia, and neuromuscular blockade to optimize transport of the head-injured patient
3. Rapid glucose determination in patients with altered mental status of undetermined etiology

4. Empirical glucose administration in patients with altered mental status of undetermined etiology

Treatment Practices: Hospital Transport Decisions

1. Direct transport of severe traumatic brain injured patients to the highest-level trauma center available
2. Emergency service transport protocols

MAJOR OUTCOMES CONSIDERED

- Predictability and reliability of Glasgow Coma Scale (GCS) scores
- Mortality
- Secondary brain injury
- Neurological function/permanent disability
- Quality of life

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Assessment: Oxygenation and Blood Pressure

MEDLINE was searched from 1966 to 1998 using the following search terms: (1) head injury and (hypoxemia or hypotension) and human subject; (2) head injury and (field or prehospital) and (treatment or management or resuscitation). Of these, 94 references were directly relevant to outcome analysis and clinical orientation; these were individually reviewed for design and content. Some studies of in-hospital patients with severe head injury and hypotension were used to corroborate prehospital hypotension studies.

Assessment: Glasgow Coma Scale (GCS) Score

The titles and abstracts of 54 journal articles were retrieved using a computerized search of the MEDLINE database from 1970 to 1998. MeSH heading combinations included "head injury" with "GCS" or "level of consciousness," using "emergency medical services" or "prehospital care" or "field care" as search parameters. The abstracts of all articles were reviewed, and those that appeared to test the strength of prehospital GCS scoring as a marking of head injury severity were selected for review of the complete articles. Manual searches of the reference lists from these articles, as well as prehospital journals not listed in MEDLINE, were also reviewed for additional relevant citations. This process resulted in five articles dealing with the prehospital measurement of GCS score, four of which related the prehospital GCS score to outcome.

Assessment: Pupils

A MEDLINE search was conducted from 1976 to 1998 using the key words "ambulance," "prehospital care," "EMS," "out-of-hospital care," and "pupils" or "eye exam," or "light reflex." No articles were found.

Treatment: Airway, Ventilation, and Oxygenation

A MEDLINE search from 1970 to 1998 was performed, using the following search terms: "head injury" and "emergency medical services" or "field" or "prehospital" and "airway management," "intubation," "oxygenation," "hyperventilation," or "hypoxia" as well as "head injury" and "intubation" and "lidocaine." This search resulted in a list of 163 references. Of these, 47 articles that appeared relevant to the prehospital setting were individually reviewed for design and content. All studies reviewed were Class II and III studies.

Treatment: Fluid Resuscitation

A MEDLINE search from 1978 to 1999 was undertaken using the following search terms: "head injury," "field or prehospital," and "fluid resuscitation." The search turned up 150 references, of which 40 were relevant to fluid therapy for the patient with severe head injury. These were individually reviewed for content.

Brain-Targeted Therapy

A MEDLINE search was performed from 1976 to 1998 using the key words "ambulance," "prehospital," "EMS," "out of hospital," and "head injury," and "mannitol" or "glucose" or "paralytic agents" or "sedation" or "analgesic" or "lidocaine" ("hyperventilation" was searched for another section of these guidelines). One article on glucose, one article on mannitol, and one article on sedation were identified. Only the article on glucose, which was a case series and, therefore, Class III evidence, had clinical relevance to the outcome.

Hospital Transport Decisions

A MEDLINE search conducted from 1970 to 1999 using the key words "trauma systems," "trauma centers," "emergency medical services," "prehospital care," and "ambulance transports" identified 147 articles.

NUMBER OF SOURCE DOCUMENTS

Assessment: Oxygenation and Blood Pressure: 17

Assessment: Glasgow Coma Scale Score: 4

Assessment: Pupils: No sources available related to this parameter

Treatment: Airway, Ventilation, and Oxygenation: 7

Treatment: Fluid Resuscitation: 8

Brain-Targeted Therapy: 2

Hospital Transport Decisions: 13

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Strength of Evidence

Class I
Evidence is derived from the strongest studies of therapeutic interventions (randomized controlled trials) in humans and used to support treatment recommendations called practice standards. Standards reflect a high clinical certainty as indicated by the scientific evidence available.

Class II
Evidence consists of comparative studies with less strength (nonrandomized cohort studies, randomized controlled trials with significant design flaws, and case-control studies) that are used to support recommendations called guidelines. Guidelines reflect a moderate clinical certainty as indicated by the scientific evidence available.

Class III
Evidence consists of other sources of information, including case series and expert opinion that support practice options. Options reflect an unclear clinical certainty as indicated by the scientific evidence available.

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

The guideline authors carefully evaluated the quality and type of each study before classifying it. In this way, a Class II study that did not provide adequate (at least six months) follow-up information was reclassified as a Class III study. Similarly, a randomized controlled trial that had inappropriate outcome measures was reclassified as a Class II study. All of these criteria apply to practice parameters that pertain to treatment. For an assessment of the literature that pertains to prognosis, diagnosis, and clinical assessment, completely different criteria were used. These are described below.

For clinical assessments, such as measuring pupillary response, Glasgow Coma Scale, or hypotension, one must be assured that the measure is reliable. Reliability means that different people with different backgrounds make an observation and see the same thing most of the time. Fortunately, good studies of the reliability of pupillary response, Glasgow Coma Scale, and hypotension have

been carried out and are discussed in the sections on assessment in the original guidelines.

If one uses clinical assessments, such as diagnostic tests, particularly as predictors of poor outcome, one must be able to determine whether the diagnostic test has sensitivity, specificity, and positive or negative predictive value. In this paradigm, the most important aspect of diagnostic assessment is positive predictive value, which represents the number of patients who had the clinical sign or prognostic indicator and had a poor outcome. For this statistic to be meaningful and useful, the guideline task force required a positive predictive value of 70% or greater to make a strong recommendation. To then relate clinical assessment to outcome requires different criteria for evaluation using studies of prognosis.

As with studies of therapeutic effectiveness, prognosis studies (including prognosis with treatment) can be strong or weak. In the strongest studies, the patients should:

1. Be seen at a uniform time in their diseases (e.g., within 24 hours of injury)
2. Be followed over time (e.g., for at least six months after injury)
3. Have their outcomes measured definitively and reliably (e.g., mortality or Glasgow Outcome Score)
4. Be part of a continuous or defined cohort of patients (e.g., an ongoing, prospectively collectable database)
5. Be examined for extraneous prognostic variables, such as underlying disease or age (e.g., use of appropriate statistics, such as multivariate analysis)

To use the same designations (Class I, II, and III) as those used for therapeutic effectiveness, the guideline task force developed the following paradigm: Class I included studies with all of the five characteristics listed above; Class II included studies exhibiting four of the five characteristics (including prospectively collected data); and Class III included studies exhibiting three or fewer of the five characteristics. Using this classification scheme, significant papers were evaluated and listed in the evidence tables within each section. It should be noted that a study, such as a case series, that might be designated as Class I by the above criteria would only be a Class III if it is included as a study on therapeutic effectiveness. Unlike therapeutic effectiveness, studies on prognosis cannot be transposed directly from classification to recommendation. In the guidelines' sections on assessment, which include prognosis studies, therefore, the guideline task force summarized the evidence rather than made recommendations.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

These guidelines used a multidisciplinary approach by involving surgeons, other physicians, paramedics, and other Emergency Medical Service (EMS) personnel in retrieving, reviewing, and evaluating the literature. These members of the guideline task force then cooperated in formulating the guidelines during several

work sessions aimed at completing understandable and applicable recommendations based on the best evidence available.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Strength of Recommendations

A
Practice standards, based on class I strength of evidence

B
Practice guidelines, based on class II strength of evidence

C
Practice options, based on class III strength of evidence

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Each guideline author conducted a MEDLINE search, reviewed, graded, and reported on clinical articles pertinent to the topic. The reports were critically reviewed by the entire guideline task force in subsequent meetings, resulting in a draft version of the guidelines. At several points during the development process, a review team comprised of major national associations that focus on trauma or emergency medical service (EMS) systems evaluated the document. Several draft documents were produced and evaluated before the final document was agreed on.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Definitions for the strength of evidence (class I, II, III) and strength of recommendations (standards, guidelines, options) are provided at the end of the Major Recommendations field.

Assessment

Oxygenation and Blood Pressure

Conclusions

A. Hypoxemia (<90% arterial hemoglobin oxygen saturation) or hypotension (<90 millimeters mercury [mm Hg] systolic blood pressure)* are significant parameters associated with a poor outcome in patients with severe head injury in the prehospital setting.
B. Measuring hypoxemia and hypotension:
    1. How to measure:
        a. Blood oxygenation: Percentage of blood oxygen saturation should be measured with a pulse oximeter.
        b. Blood pressure: Systolic blood pressure (SBP) and diastolic blood pressure (DBP) should be measured using the most accurate method available under the circumstances.
    2. When to measure: Oxygenation and blood pressure should be measured as often as possible and should be monitored continuously if possible.
    3. Who should measure: Trained medical personnel should measure oxygenation and blood pressure.

*In children, Class II evidence indicates that SBP is linked to poor outcome according to the following age groups: SBP <65 mm Hg (0 to 1 years of age); <75 mm Hg (2 to 5 years); <80 mm Hg (6 to 12 years); <90 mm Hg (13 to 16 years). Therefore, the above values should be considered hypotension for the corresponding age groups with severe traumatic brain injury (TBI).

Glasgow Coma Scale Score

Conclusions

A. No Class I evidence is available on which to base conclusions for this parameter. Studies performed or initiated in the prehospital setting were reviewed in order to determine this.
B. Class II data indicate that the prehospital measurement of the Glasgow Coma Scale (GCS) score (refer to Table A in the original guideline document for details) is a significant and reliable indicator of the severity of head injury, particularly in association with repeated scoring and improvement or deterioration of the score over time. A single field measurement of the GCS score cannot predict outcome; however, a decrease of two points with a GCS score of nine or lower indicates serious injury. Prehospital- and hospital-based study data indicate that a GCS score of 3 to 5 has at least a 70% positive predictive value for poor outcome.
C. Obtaining the GCS score
    1. How to measure the GCS score:
        a. The GCS score must be obtained through interaction with the patient (e.g., by giving verbal directions or, for patients unable to follow commands, by applying a painful stimulus such as nail bed pressure or axillary pinch).
    2. When to measure the GCS score:
        a. The GCS score should be measured after the initial assessment, after a clear airway is established, and after necessary ventilatory or circulatory resuscitation has been performed.
        b. The GCS score should be measured preferably prior to administering sedative or paralytic agents, or after these drugs have been metabolized.

3. Who should measure the GCS score?
    a. The GCS score can be measured fairly reliably by trained Emergency Medical Services (EMS) personnel.

Pupils

Conclusions

A. Data are insufficient to support conclusions on the diagnostic and prognostic value of an examination of the pupils performed in the prehospital environment.
B. Parameter measurement:
    1. How should the pupils be examined?
        a. Asymmetry is defined as a 1 mm (or more) difference in the size of one pupil.
        b. A fixed pupil is defined as no response (<1 mm) to bright light
        c. Note evidence of orbital trauma
        d. Note left and right distinction and duration of the following:
            - Unilateral or bilateral fixed pupil(s)
            - Unilateral or bilateral dilated pupil(s)
            - Fixed and dilated pupil(s)
    2. When should the pupils be examined?
        a. After the patient has been resuscitated and stabilized.
    3. Who should examine the pupils?
        a. Trained prehospital care providers

Treatment

Airway, Ventilation, and Oxygenation

A. Standards

Insufficient data about airway, ventilation, and oxygenation in the prehospital setting have been published to support a treatment standard on this topic.

B. Guidelines
    1. Hypoxemia (apnea, cyanosis, or arterial hemoglobin oxygen saturation [SaO_2<90%) must be avoided, if possible, or corrected immediately. When equipment is available, oxygen saturation should be monitored on all patients with severe traumatic brain injury (TBI) as frequently as possible or continuously. Hypoxemia should be corrected by administering supplemental oxygen.
C. Options
    1. The airway should be secured in patients who have severe head injury (Glasgow Coma Scale [GCS] score <9), the inability to maintain an adequate airway, or hypoxemia not corrected by supplemental oxygen. Endotracheal intubation, if available, is the most effective procedure to maintain the airway.
    2. Routine prophylactic hyperventilation should be avoided. Hyperventilation in the field is indicated only when signs of cerebral herniation, such as extensor posturing or pupillary abnormalities

(asymmetric or unreactive), are present after correcting hypotension or hypoxemia.

3. Normal ventilation is defined as approximately 10 breaths per minute (bpm) for adults, 20 bpm for children, and 25 bpm for infants. Hyperventilation is defined as approximately 20 bpm for adults, 30 bpm for children, and 35 bpm for infants. (Hyperventilation is discussed in greater detail in the section on brain-targeted therapy below.)

Fluid Resuscitation

A. Standards

Data are insufficient to support a treatment standard for fluid resuscitation in the patient with severe traumatic brain injury.

B. Guidelines

Fluid resuscitation in patients with TBI should be administered to avoid hypotension and/or limit hypotension to the shortest duration possible. In the adult trauma literature, hypotension is usually defined as a systolic blood pressure (SBP) of $\leq$90 mm Hg. In children, hypotension is usually defined as SBP less than the fifth percentile for the age. In children with severe TBI, Class II data link blood pressure and outcome. Hypotension can, therefore, be defined as a SBP <65 mm Hg (0 to 1 year); <75 mm Hg (2 to 5 years); <80 mm Hg (6 to 12 years); and <90 mm Hg (13 to 16 years) in pediatric severe TBI patients (Kokosaka et al., 1990).

C. Options

Based on Class III evidence, fluid therapy is utilized to support cardiovascular performance in an effort to maintain adequate cerebral perfusion pressure and limit secondary brain injury. The most commonly used resuscitation fluid trauma patients in the prehospital setting is isotonic crystalloid solution. It is administered in quantities necessary to support blood pressure in the normal range, although there are little data to support a specific target blood pressure. Inadequate fluid volumes or under-resuscitation can precipitate sudden hypotension and should be avoided. Hypertonic resuscitation, generally utilizing hypertonic saline with or without dextran, has been used with some encouraging results. No studies prove the efficacy of mannitol in the prehospital setting.

Brain-Targeted Therapy

A. Standards

Class I data are insufficient to support prehospital brain-specific treatment standards, including hyperventilation, mannitol, lidocaine, sedation, analgesics, paralytics, and glucose administration for the patient with traumatic brain injury (TBI).

B. Guidelines

Class II data are insufficient to support the creation of prehospital brain-specific treatment guidelines.

C. Options

Class III data support the following treatment options:

Treatment of cerebral herniation: The clinical signs of cerebral herniation in an unconscious and unresponsive patient include extensor posturing or no motor response: asymmetric or dilated and unreactive pupils. Hyperventilation (20 bpm in an adult, 25 bpm in a child, and 30 bpm in an infant less than one year old) is the first line of intervention in the patient with suspected cerebral herniation. Neurologic status requires frequent reevaluation and, in the subsequent absence of clinical signs of herniation, hyperventilation should not be continued.

The prehospital use of mannitol currently cannot be recommended.

Treatments to optimize patient transport: Sedation, analgesia, and neuromuscular blockade can be useful to optimize transport of the head-injured patient. Because no outcome studies provide guidance on the use of these adjuncts, the timing and choice of agents are best left to local Emergency Medical Service (EMS) protocols.

Treating other causes of altered mental status: Hypoglycemia has been reported as the cause of traumatic events. As with brain injury, hypoglycemia may present with altered mental status with or without focal neurologic deficits. From Class III data, this guideline recommends that patients with altered mental status of undetermined etiology have a rapid glucose determination or be given glucose empirically.

Hospital Transport Decisions

A. Standards

Class I data are insufficient to support a treatment standard for this topic.

B. Guidelines

Class II data support the recommendation that all regions have an organized trauma care system that develops protocols to direct emergency medical service (EMS) personnel regarding transport decisions for trauma victims. Recognizing at the scene or in the ambulance that a patient has sustained severe traumatic brain injury guides hospital destination.

Class II data support the recommendation that patients who with severe TBI with a Glasgow Coma Scale (GCS) score less than 9 be transported directly to a facility identified as having the following capabilities: immediately available CT scanning, prompt neurosurgical care, and the ability to monitor

intracranial pressure and treat intracranial hypertension, as delineated in Guidelines for the Management of Severe Head Injury.

C. Options

Class III data support the recommendation that all EMS systems develop transport protocols to help line EMS personnel make specific decisions regarding trauma center destination for head injury patients. Patients with GCS scores of 9 to 13 have potential for intracranial injury and neurosurgical intervention, and should therefore be transported to a trauma center for evaluation.

Definitions

Relationship Between Strength of Evidence and Strength of Recommendations

Class I
Evidence is derived from the strongest studies of therapeutic interventions (randomized controlled trials) in humans and is used to support treatment recommendations called practice standards. Standards reflect a high clinical certainty as indicated by the scientific evidence available.

Class II
Evidence consists of comparative studies with less strength (nonrandomized cohort studies, randomized controlled trials with significant design flaws, and case-control studies) that are used to support recommendations called guidelines. Guidelines reflect a moderate clinical certainty as indicated by the scientific evidence available.

Class III
Evidence consists of other sources of information, including case series and expert opinion, that support practice options. Options reflect an unclear clinical certainty as indicated by the scientific evidence available.

Strength of Recommendations

A
Practice standards, based on class I strength of evidence

B
Practice guidelines, based on class II strength of evidence

C
Practice options, based on class III strength of evidence

CLINICAL ALGORITHM(S)

The original guideline contains a clinical algorithm for prehospital assessment and treatment of traumatic brain injury.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

References open in a new window

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see Major Recommendations). Evidence tables, found at the end of each major section of the original guideline, are generally divided into three sections: study description, strength of evidence classification (class I, II, III), and conclusion(s), with an occasional fourth section, summary of outcome data. Evidence classifications are listed below.

Assessment: Oxygenation and Blood Pressure: The evidence table lists nine Class II and eight Class III studies.

Assessment: Glasgow Coma Scale Score: The evidence table lists four Class III studies.

Assessment: Pupils: No evidence is available on which to base conclusions for this parameter.

Treatment: Airway, Ventilation, And Oxygenation: The evidence table lists three Class II and four Class III studies.

Treatment: Fluid Resuscitation: The evidence table lists two Class I, five Class II, and one Class III studies.

Brain-Targeted Therapy: The evidence table lists one Class II and one Class III study. Two other studies are listed but not classified because no conclusions could be drawn.

Hospital Transport Decisions: The evidence table lists four Class II and nine Class III studies.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Prehospital emergency medical care can help minimize the impact of secondary injury.
- Prehospital endotracheal intubation (along with supplemental oxygenation) has been associated with significantly improved survival.
- The use of fluid resuscitation to elevate blood pressure in hypotensive, severe head injury patients has been strongly correlated with improved outcome.

POTENTIAL HARMS

- Hyperventilation, which may be indicated in the presence of signs of cerebral herniation, can seriously compromise cerebral perfusion and may reduce cerebral blood flow by as much as two-thirds of normal, potentially to the point of cerebral ischemia.
- Controversies regarding prehospital diagnosis and management of hypoglycemia include (1) the accuracy of glucose reagent test strips in the prehospital setting; (2) the effect of poor peripheral perfusion on the accuracy of glucose reagent test strips; and (3) the potential harm of empiric glucose administration to patients with brain injury.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

The information contained in these guidelines, which reflects the state of knowledge at the time of completion (February 2000), is intended to provide accurate and authoritative information about the subject matter covered. Because there will be future developments in scientific information and technology, it is anticipated that there will be periodic review and updating of these guidelines. These guidelines are distributed with the understanding that the Brain Trauma Foundation, the National Highway Traffic Safety Administration, and the other organizations that have collaborated in the development of these guidelines are not engaged in rendering professional medical services. If medical advice or assistance is required, the services of a competent physician should be sought. The recommendations contained in these guidelines may not be appropriate for use in all circumstances. The decision to adopt a particular recommendation contained in these guidelines must be based on the judgment of medical personnel, who take into consideration the facts and circumstances in each case, and on the available resources.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness
Timeliness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Brain Trauma Foundation. Guidelines for prehospital management of traumatic brain injury. New York (NY): Brain Trauma Foundation; 2000. 81 p. [165 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2000

GUIDELINE DEVELOPER(S)

Brain Trauma Foundation - Disease Specific Society
National Highway Traffic Safety Administration - Federal Government Agency [U.S.]

SOURCE(S) OF FUNDING

Supported by a grant from the National Highway Traffic Safety Administration

GUIDELINE COMMITTEE

Emergency Medical Services Task Force

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Authors: Edward J. Gabriel, MPA, AEMT/P; Jamshid Ghajar, MD, PhD, FACS; Andrew Jagoda, MD, FACEP; Peter T. Pons, MD, FACEP; Thomas Scalea, MD, FACS; Beverly C. Walters, MD, MSc, FRCSC, FACS

Participants: James R. Bedell, MD; John Bruns, Jr., MD; Randall M. Chesnut, MD, FCCM; Captain Garry B. Criddle, RN, CDR; Lorraine M. Giordano, MD, FACEP; Peter C. Quinn; David Thurman, MD; Pamela Drexel Walker

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

ENDORSER(S)

World Health Organization - International Agency

GUIDELINE STATUS

This is the current release of the guideline.

An update is not in progress at this time.

GUIDELINE AVAILABILITY

Electronic copies: Available from the Brain Trauma Foundation Web site.

Print copies: Available from the Brain Trauma Foundation, 523 East 72nd Street, New York, NY 10021, USA; Fax: 212-772-0357. An order form is also available on the Brain Trauma Foundation Web site.

AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on December 11, 2002. The information was verified by the guideline developer on December 24, 2002.

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Date Modified: 11/15/2004